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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Patrick J. Kelly, Ph.D.
Synnestvedt & Lechner LLP
2600 Aramark Tower
1101 Market Street
Philadelphia, PA 19107-2950

EXAMINER	
IBRAHIM, MEDINA AHMED	

ART UNIT	PAPER NUMBER
1638	

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/022,025	COLEMAN ET AL	
	Examiner	Art Unit	
	Medina A Ibrahim	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

eriod for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

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1)☒ Responsive to communication(s) filed on *23 January 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

sposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 10-19* is/are rejected.

7)☒ Claim(s) *9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

pplication Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

riority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

tachment(s)

☒ Notice of References Cited (PTO-892)

☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *05 Aug 02* .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Claims 1-19 are pending and are under consideration.

Claim Objections

At claims 2 and 3, ---nucleic acid--- should be inserted before "molecule" for proper dependency.

Claim 11 is objected to because it does not further limit parent claim 1.

At claim 15, it is unclear if the plant, plant part, seed, and plant cell also contain the nucleic acid molecule of claim 1.

At claim 17, ---and --- should be inserted before "wheat" for proper Markush terminology.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-8 and 10-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are indefinite in the recitation "ABACP polypeptide" and "ABACP activity" which are not clearly defined in the specification. It is unclear what the abbreviation stands for. Since the name "ABACP" is not known in the art, the use of said name does not carry art-recognized limitations as to the specific or essential characteristics that are associated with that denomination. The name ABACP" does not clearly identify the claimed polypeptide or nucleic acid molecules, and does not set forth

the metes and bounds of the claimed invention. The name appears to have been arbitrarily assigned and can be changed. The specific characteristics associated therewith can also be modified.

Claim 4 is indefinite for reciting improper Markush terminology. It is suggested that ---and--- be inserted before the semicolon. The claim is also indefinite for failing to recite the specific hybridization conditions required for "high", "moderate", and "low" stringency. There are many different ways to define such hybridization conditions, and therefore it is unknown what is encompassed by the claim. Appropriate correction is required to more clearly define the metes and bounds of the claims.

In claim 13 "recombinant nucleic acid molecule" lacks antecedent basis.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-8 and 10-19 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the isolated nucleic acid molecule of SEQ ID NO: 1 or 2, and plant/plant cell comprising it, does not reasonably provide enablement for an isolated nucleic acid molecule encoding an ABACP polypeptide or a polypeptide having ABACP activity, and nucleic acid molecules that hybridize to SEQ ID NO: 1 or 2 or having at least 17% sequence identity to SEQ ID NO: 1or 2 or comprising a fragment thereof, and encoding an ABACP polypeptide, plant/plant cell comprising it. The specification does not enable any person skilled in the art to which it pertains, or with

which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

Applicant broadly claims an isolated nucleic acid molecule encoding a polypeptide having ABACP activity including those comprising a (+)- ABA 8' hydoxylase, a nucleic acid molecule that hybridizes to SEQ ID NO: 1 or 2 under low, moderate, and high stringency conditions, a nucleic acid molecule having at least 17% sequence identity to SEQ ID NO: 1or 2 or comprising a fragment or 30 contiguous bases thereof, and encoding an ABACP polypeptide or polypeptide having ABACP activity, plant/plant cell comprising it. Applicant also claims specific monocot and dicot plants.

Applicant teaches identification of two mutant lines (CO2 non- responsive (cnr) and CO2 hyper responsive (chr) produced by mutagenizing Arabidopsis thaliana plantlets randomly with T-DNA insertion and screening for their ability to respond to 3000 ppm CO2 for four days. In addition to high CO2 insensitive phenotype, cnr2-1 plants showed little anthocyanin coloring, supersensitivity to high levels of exogenous hexose, greater seed dormancy, reduced levels of conductance, water loss after excision of the rosette, reduced stomatal aperature, and hypersensitive to ABA, as compared to a wild type. The cnr2-1 mutants were selected for the identification further study. Applicant also teaches analysis of ABA content in fresh and rehydrated tissues of cnr2-1 mutants as compared to wild type plants (Table 3). Applicant further teaches identification of cDNA and genomic clones (SEQ ID NO: 1 and 2), and antisense and overexpression of cDNA in wild type plants (Experiments 1-5). Therefore, SEQ ID NO: 1

encoding SEQ ID NO: 2 is a CYP78 (cytochrome P450) involved in ABA regulation through ABA catabolism in Arabidopsis.

Applicant has not provided guidance for how to identify and obtain nucleic acid molecules of the invention as broadly claimed. Applicant has not provided guidance nucleic acid molecules other than SEQ ID NO: 1 encoding a (+) ABA 8'hydrolxylase. No guidance has been provided with regard to hybridization/wash or PCR conditions and probes/primers that would allow the specific isolation of the target genes.

The state of the art for isolating nucleic acid molecules with specified function is highly unpredictable. Substantial guidance is required with respect to hybridization/wash conditions that would allow the specific isolation of the target nucleic acid molecules. In the absence of such guidance, one skilled in the art has to proceed with trial and error experimentation to screen through the vast number of cDNA and genomic clones to identify those nucleic acids encoding proteins having the desired functional activity, and to evaluate the ability of said nucleic acids to affect ABA (abscisic acid) catabolism of a transgenic plant. At page of the specification, Applicant states "...to date, no one has been able to isolate and sequence the (+)-ABA 8'-hydroxylase gene or protein. In fact, the protein has not even been purified to homogeneity as identified as a single band by protein gel electrophoresis". Applicant further states " There are many reasons for the problems in isolating the gene and protein, including the very low levels of gene expression and resulting enzyme activity, the instability of enzyme activity in plant extracts, and its association with membranes and cofactors which appear to be required for catalytic activity".

In addition, while the plant growth regulator ABA has been the subject of study for may years, little is known in regarding the control of ABA levels or the specific mechanisms by which ABA mediates is activity (Trends in Plant Science Reviews (1999), Vol. 4 (12), pp. 472-478 (Applicant's IDS); see paragraph bridging pages 475 and 476 (Applicant's IDS).

With respect to the claimed hybridizing sequences, fragments and sequences having at least 17% sequence identity, Applicant has not provided guidance for regions in the full length sequence of SEQ ID NO: 1 which would tolerate modifications. Applicant has not taught which fragment or 30 contiguous bases has the ability to encode a functional polypeptide having the desired activity. Therefore, Applicant has not provided guidance for modifications to SEQ ID NO: 1 that resulted in nucleotide sequences having both the structural and functional limitations as recited in the claims.

While mutagenesis techniques are known, it is not routine in the art to screen for multiple substitutions or multiple modifications as encompassed by the instant claims. One skilled in the art would expect any tolerance to modification for a given DNA/protein to diminish with each further and additional modification or multiple substitutions/ deletions. One skilled in the art would have to make all possible nucleotide substitutions and deletions in the 2009 nucleotide long sequence of SEQ ID NO: 1 and test all nucleotide sequences that meets the structural limitations to determine which also meet the functional limitation.

Therefore, given the lack of sufficient guidance in the specification; the limited working examples; the nature of the invention; the state of the art and unpredictability as

discussed above, the claimed invention is not enabled throughout the broad scope. See, *In re Wands (858F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988).* See also I*n re Fischer, 166 USPQ 19 24 (CCPA 1970)* where the court held the scope of the claims must bear a reasonable correlation with the scope of the enablement.

Written Description

Claims 1-8 and 10-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant broadly claims any and all isolated nucleic acid molecules encoding a polypeptide having ABACP activity including those comprising a (+)- ABA, all nucleic acid molecules that hybridize to SEQ ID NO: 1 or 2 under low, moderate, and high stringency conditions, all nucleic acid molecules having at least 17% sequence identity to SEQ ID NO: 1or 2 or comprising a fragment or 30 contiguous bases thereof, and encoding an ABACP polypeptide or polypeptide having ABACP activity, plant/plant cell comprising it. Applicant also claims specific monocot and dicot plants. In contrast, Applicant only describes SEQ ID NO: 1 or 2. These are genus claims.

In *Eli Lilly and Co.* 43 USPQ2d 1398 (Fed. Cir. 1997), the court stated:

An adequate written description of a DNA "requires a precise definition, such as by structure, formula, chemical name, or physical properties", not a mere wish or plan for obtaining the claimed chemical invention... Accordingly, "an adequate written description of a DNA requires more than a mere statement that it is part of the invention and reference to a potential method of isolating it; what is required is a description of the DNA itself (43 USPQ2d at 1404).

The court held that held that human insulin-encoding cDNA is not described by prophetic example, which sets forth only a general method for obtaining the human cDNA:

The name cDNA is not itself a written description of that DNA; it conveys no distinguishing information concerning its identity...Describing a method of preparing a cDNA or even describing the protein that the cDNA encodes...does not necessarily describe the DNA itself. No sequence information indicating which nucleotides constitute human cDNA appears in the patent, as appears for rat cDNA....Accordingly, the specification does not provide a written description of human cDNA (43 USPQ2d at 1405).

The description of a single species of rat cDNA was held insufficient to describe the broad genera of vertebrate or mammalian insulin:

"In claims to genetic material...a generic statement such as 'vertebrate insulin cDNA' or 'mammalian insulin cDNA', without more, is not an adequate written description of the genus because it does not distinguish the claimed genus from others, except by function. It does not specifically define any of the genes that fall within its definition. It doesn't define any structural features commonly possessed by members of the genus that distinguish them from others. One skilled in the art therefore cannot, as one can do with a fully described genus, visualize or recognize the identity of the members of the genus. A definition by function...does not suffice to define the genus because it is only an indication of what the gene does, rather than what it is (43 USPQ2d at 1406).

The court continued:

"Thus...a cDNA is not defined by the mere name 'cDNA', even if accompanied by the name of the protein that it encodes, but requires a kind of specificity usually achieved by means of the recitation of the sequence of nucleotides that make up the cDNA...A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus". (43 USPQ2d at 1406). See also where the court teaches that the disclosure of a process for obtaining cDNA from a particular organism and the description of the encoded protein fail to provide an adequate written description of the actual cDNA from the organism which would encode the protein from that organism, despite the disclosure of a cDNA encoding that protein from another organism.

The claimed invention does not meet the current written description requirement for the following reasons: firstly, Applicant has not described the composition and structure of all nucleic molecules encoding ABACP as claimed in claims 1 and 10-11. The nucleic acid of claims 2-3 and 7 are only described in that it encodes a polypeptide that catabolizes ABA or comprises a (+)-ABA 8' hydroxylase. Secondly, the "low", "moderate", and "high" stringency conditions of claim 4 and the low stringency conditions of claim 5, and the nucleic acid molecules having as low as 17% sequence identity to the disclosed sequence are not predictable to yield nucleic acid molecules that are structurally and functionally related to SEQ ID NO: 1 or 2. Thirdly, Applicant has not described structural elements common to all nucleic acid molecules encoding a polypeptide that catabolizes ABA that would allow one skilled in the art to predictably determine what will be the structure of the members of the genus. A literature review does not indicate that such structural elements would be well known in the art. Lastly, substantial variation in structures and function are expected among nucleic acid molecules that share any fragment/part or any 30 contiguous bases of SEQ ID NO: 1 or 2. Consequently, Applicant has not described a representative number of nucleic acid molecules of the genus claimed. Since Applicant has not described the nucleic acid molecules of the claimed invention, host cells and plant cells/ seed/plant parts/progeny comprising said nucleic acid molecules are similarly not described.

Therefore, the claimed invention does not meet the current written description requirements. See, also, the Written description Examination Guidelines published in Federal Registry/Vol. 66, No.4/Friday, January 5, 2001/Notices).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-6, 8, 10-11, and 13-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Siminiszky (PNAS, vol. 96 (4), pp. 1750-1755 (U).

The claims are drawn to an isolated nucleic acid molecule encoding ABACP polypeptide or a polypeptide having ABACP activity, catabolizes ABA, genomic DNA, cDNA or RNA, a part of SEQ ID NO: 1 or 2 or that hybridizes thereto under undefined " high" and "moderate" and low stringency conditions, or having at least 17% sequence identity to SEQ ID NO: 1 or 2, a host cell/plant cell/ or a plant comprising said nucleic acid molecule, wherein the plant is a dicot. "ABACP" polypeptide or polypeptide having "ABACP" activity are not clearly defined in the specification (see 112, 2nd rejection above)

Siminiszky et al teach an isolated nucleic acid encoding a polypeptide having cytochrome P450 monooxygenase activity, said nucleic acid shares 40.9% identity and a local similarity of 66.5% to SEQ ID NO: 2 (see attached Sequence Search Result, pp. 13-14). The nucleic acid of the prior art would comprises "fragment", "part" of SEQ ID NO: 2 and would hybridize thereto, under any "low", "high" and "moderate" conditions, and the low stringency conditions of claim 5; given the 40.9% identity and 66.5% local

similarity. Siminiszky also teaches tobacco cells and plant transformed with said nucleic acid. Therefore, Siminiszky teaches all claim limitations.

Claims 1-2, 4-6, 8, 10-11, and 13-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Siminiszky et al (US 6,121,512).

Siminiszky et al teach an isolated nucleic acid encoding a polypeptide having cytochrome P450 monooxygenase activity, said nucleic acid shares 20.9% identity and a local similarity of 58.1% to SEQ ID NO: 1 (see attached Sequence Search Result, pp. 1-2). The nucleic acid of the prior art would comprises "fragment", "part" of SEQ ID NO: 1 and would hybridize thereto, under any "low", "high" and "moderate" conditions, and the low stringency conditions of claim 5; given the 20.9% identity and 58.1% local similarity. Siminiszky also teaches transformation of monocots and dicot plants and cells with said nucleic acid. Therefore, Siminiszky teaches all claim limitations.

Conclusion

Claims 3, 7, 9 and 12 are deemed free of the prior art given the failure of the prior art to teach or reasonably suggest an isolated nucleic acid molecule encoding a polypeptide comprising a (+)-ABA 8' hydroxylase and the nucleic acid molecule of SEQ ID NO: 1 or 2 or a complement thereof or a 30 contiguous bases thereof.

Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

No claim is allowed.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Medina A. Ibrahim whose telephone number is (571) 272-0797. The Examiner can normally be reached Monday -Thursday from 8:00AM to 5:30PM and every other Friday from 9:00AM to 5:00 PM. Before and after final responses should be directed to fax nos. (703) 872-9306 and (703) 872-9307, respectively.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Dr. Amy Nelson, can be reached at (571) 272-0804.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Medina A. Ibrahim
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